Michigan Alliance for Greater Mobility Advancement

Course Title: Electrified Propulsion Systems

Course Length: 2 days

Time Online: 16 hours

Time in Class: N/A

Time in Lab: N/A (Lab Activities Offered through Separate Course "Electrified Propulsion Systems Lab")

Class Size: Minimum 6 / Maximum 50

Price Per Student: $930.00*

Location: Virtual

Course Description:

Electrified Propulsion Systems examines sub-system operation, energy flow, architecture, and systems level integration of Hybrid Electric Vehicles (HEV) and Battery Electric Vehicles (BEV). This course can be taken as either a standalone course, or as a pre-requisite for the laboratory activities that accompany this course and are delivered on-site at the customers location (see the course titled "Electrified Propulsion Systems Lab").

This course is well suited to engineers, managers, technicians, and other staff including those with primary roles in marketing, service, etc.

Lab Projects Description:

Hands-On Experimental Lab projects are not included in this course; however, a separate course accompanies this course and provides extensive hands-on learning opportunities (see course title "Electrified Systems Lab"). However, this course does include interactive demonstrations of vehicle simulation, and other engineering tools.

Course Learning Objectives:

- Be able to distinguish automotive architectures and platforms
- Critique automotive architectures and platforms with an in-depth knowledge and understanding of performance and efficiency differences of each
- Understand and relate propulsion system performance to fundamental sub-system operational principals
- Be able to select and optimize major sub-systems and components for overall performance

Course Content/Syllabus

- Course Overview (Learning Objectives, Introductions, Outline, etc.)
- Motivation for Electrified Propulsion Systems – The Big Picture

* Price based on minimum enrollment, subject to change

- Requirements; Emissions, Fuel Economy, Performance, etc.
- Vehicle Energy Losses
- HEV Architecture w/ real-world case studies
    - Planetary Electronically Variable Transmissions
    - Vehicle simulation demonstration of performance of different electrified architectures
- Batteries
    - Fundamentals
    - Application considerations in modern electrified vehicles
- Electric Machines & Power Electronics
    - Fundamentals
    - Application considerations
- Engines
    - Fundamentals
    - Applications considerations
- System Level / Integration Level Opportunities and Effects
    - Engine Start / Stop
    - Regenerative Braking
    - NVH
    - Implications to Control & Calibration
    - Human Factors
- Student Assessment (Exam)
- Course evaluations